MANAGERIAL DISCRETION, PROPERTY RIGHTS,

AND THE THEORY OF FIRMS

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A. Introduction

Post war attacks on the neo-classical theory of the behavior of individuals in the firm (usually called the "theory of the firm") have cast doubt on the profit maximising criterion as an objective function, particularly since empirical evidence refuting its implications seemed overwhelming. The evidence that has been offered has suggested that those individuals working within firms (managers, employees, employers) pursue policies which increase, for example, gross assets, sales, employees, or expenditures for equipment and executive facilities beyond those that yield a profit maximum. Attempts to save the traditional theory by casting it in a wealth maximizing framework have removed only some of the conflicting evidence.

In any science, whenever empirical events are observed which conflict with the predictions of existing theories two approaches at a reconciliation are possible. First, the newly observed phenomena may not properly belong to the class of phenomena that the thory is designed to explain. In this case some extension of the theory may be called for if the unexplained phenomena is relatively close in nature to that of the theory. For example, Newtonian physics can explain the acceleration of a falling body in a vacuum. Objects dropped in normal air will not necessarily conform with Newton's equations. However, physicists can extend the theory to include the extra effects of air density, etc. The neo-classical theory of firms is designed to explain the behaviour of owner-managers who have perfect knowledge (i.e. zero information costs) with respect to the values of the firm's parameters and the effects of his policy decisions. Observations, then, of non-profit (on wealth) maximising behaviour in multi-owner, multi-manager firms do not necessarily invalidate

the traditional analysis, except to suggest the need for an expanded analytical model of the firm. Extensions in this case would include a general structural extension of the model to explain behaviour in various institutional arrangements, rather than an ad hoc modification for each new kind of form encountered.

The second approach to a reconciliation of observed and predicted phenomena is the formulation of a new theory where not only is the potential class of explanable phenomena extended, but the basic tenants and structure of the theory as well. The development of the telescope lead to more refined observations of the movement of the planets which could not be explained by the prevailing theory which held that the earth was the centre of the "solar system". The alternative theory that the sun was the centre lead to the Copernican revolution; new phenomena were explained as well as old (the moon still rotated around the earth). In the theory of the firm, the second approach would involve in one instance, changing the objective function(s) of the owner(s) and manager(s).

The foregoing discussion of the scientific method was carried out because this paper is an attempt to work toward a general theory of individual behaviour in the firm (or any organisation which makes economic decisions). Many of the new theories of the firm are ad hoc theories which are valid only for a smaller class of phenomena. What we would like to develop is a theory which, while perhaps requiring ad hoc adaption for the purpose of empirical testing in a specific situation, would nevertheless be generally valid.

When the two reconciliation approaches discussed above are applied to the conflict between neo-classical theory and modern observation, a

modification of the theory in two corresponding ways is suggested. First, since modern firms differ substantially from the neo classical firm in size, in the institutional owner-manager set up, in geographical dispersities, etc., the type of firm is different so the decision-makers face different constraints on their activities. Thus even preserving a wealth maximising postulate, a theory which takes account of the constraints faced by the decision makers whose observed behaviour is trying to be explained will make different predictions from one which does not. The different constraints faced by owner and/or managers in modern firms (which stem from the institutional set-up) would correspond to a different set of phenomena from the one which the traditional theory was designed to explain.

Secondly, the basic tenants of the traditional theory, that is to say the objective functions of the economic agents in the theory of the firm, have been questioned as correct (and even logical) in the modern firm. The "old schizophrenia between consumption and production behaviour"(1) has been questioned and non-pecuniary sources of utility have been suggested for inclusion in the utility function of income earners. This second approach is an attempt, then, to explain the empirical observations of non-wealth maximising behaviour on the basis of different objective functions.

The two approaches do not necessarily compete or work against each other in the development of a theory. In the reformulation of the theory of the firm this is certainly true. Changing the constraints facing profit maximising owners and managers will certainly change the equilibrium of the firm and the introduction of new constraints may change the sign of comparative static multipliers. But this change in the theory may still yield implications which are inconsistent with empirical observations and so a further change,

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(1) Alchian, [1965], p. 31. Nov. 1965.

e.g., in the objective function of the firm's decision makers, may be called for. Profit maximisation may have been an adequate objective function in the theory when the constraints were such that the only thing the manager could do was to maximise profits. In the case where there are zero information costs and perfect markets (in particular a perfect capital market), the owner and/or manager will have to maximise profits, or face extinction.(2)

But the constraints (about to be discussed) which the present owners and managers face (in particular the managers) are such that profit maximisation is not a necessary condition for survival. It therefore is reasonable to include a somewhat weaker assumption regarding objective functions, in which profit maximisation still remains a possibility and one which could become realized if a return to the neo-classical constraints were contemplated.

With regard to these two lines of attack on the theory of the firm, there are roughly two groups of literature which have made progress toward a more generalised and valid theory. On the objective function side, the work of Becker [1957], O.E. Williamson [1964], Marris, [1964] and others, has pointed to the elevation of a utility function as an objective function for managers, while in some cases (Baumol [1959]) profit maximisation has been replaced by another objective, e.g. sales maximisation. In what follows we shall build upon these advances, while synthesising them with developments on the constraints side. The theory of property rights and external behaviour developed by Demsetz [1964], [1966], [1967] and Alchian [1961], [1965], will be applied to the institutional

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(2) This assumes, of course, that an ultimate goal is survival vis à vis that particular firm or industry. The survival issue which was discussed early in the 1950's by Alchian [1950] and Penrose [1952] has recently cropped up again. Winter [1967], Ladd [1969].

owner-manager situation in an effort to derive the managerial opportunity set. As Alchian has pointed out:

> The utility maximising theory is applicable and useful if, and only if, (1) we can identify some of its components (beside direct pecuniary wealth) and if (2) we can identify circumstances that involve differences in the costs of each of the various types of managerial non-pecuniary "goods". By satisfying these two conditions, we can deduce the relative extent of such activities in each of these circumstances.(4)

In addition, papers by Alchian [1965a], Alchian and Kessel [1962] and Averch and Johnson [1962] have also explored the effects of various constraints on managerial behaviour where profit maximisation was not the objective function. The present paper is a step toward synthesizing all of this into a rigorous, general model of the theory of the management of the firm. In part B we will explain a utility maximisation model which makes use of standard microeconomic tools. In part C we will explore the nature of enforcement, and the way in which institutional considerations affect enforcement.

B. A Utility Maximisation Model in the Neo-classical Tradition

1. Institutional Considerations

First, let us discuss two institutional factors which have developed and which our modified theory should consider:

(a) the growing trend towards diffuse ownership of firms which effectively separates ownership and management, and (b) the growth in the size of firms, where size may be defined as the number of employees within the firm.

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(4) Alchian [1965], p. 34.

Many firms today are characterised by an ownership pattern that is so widespread that no one person or interest group controls a large percentage of the shares in the firm. It is not economically efficient for the owners (shareholders) to manage the firm because organisation, communication, and information costs for a thousand or more owners would erase any gains in wealth accrued to them via the firm. When we refer to the "owners" of a firm we will make the simplifying assumption that their only interest in the firm is as a wealth maximising investment. Thus, we preserve the wealth maximising objective of the firm owners. Such wealth is a function of the present value of two variables, the price of the stock at the time of sale, P_T, and the stream of dividends, d_t, from the present to the time of sale, T. The wealth of the stockholder is thus written:

$$W = \frac{P_T}{(1+r)^T} + \sum_{t=1}^{T} \frac{d_t}{(1+t)^t}$$

If both P_T and d_t are normally increasing functions of the wealth of the firm, stockholders can maximise their wealth if the firm operates as a wealth maximiser (i.e. the familiar neo-classical behavioural assumption).(*) However, as pointed out above, thousands of stockholders cannot effectively manage a firm. They surrender this right ot a much smaller group (not necessarily stockholders) called "management", which makes the operational decisions of the firm. However, the owners have no guarantee that management will behave in the firm as wealth maximisers. While management may be hired to maximise the wealth of the firm, it is encumbant on the shareholders to 'enforce" their contract with management. But this enforcement will involve costs to the owners

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(*) Since we will not consider any adjustment costs, our model will be static; we will then not distinguish between wealth, and profit maximising behaviour.

similar to the kind alluded to above.

The growth in the size of firms as measured by the number of employees in the firm has been treated by Tullock [1965] and extended by Williamson [1963] to show that firm size, ceteris paribus, can effect a firm's behaviour regarding wealth maximisation. Monsen and Downs [1965] have pointed out that large firms develop bureaucratic management structures to facilitate managerial activities. These take the form of hierarchies which are inevitably characterized by a conflict of interest within the structure, by communication distortion between levels (i.e. information costs), and by the difficulty (costs) of bringing the costs and revenues associated with a decision to bear upon the decision maker. Hence, due to this diffuse managerial structure any attempts to enforce wealth maximising behaviour will again involve information, organisation, and enforcement costs to the party or parties interested in the firm's operation as a wealth maximiser. This type of enforcement cost arises independently of the amount or type of diffusion of ownership. Thus, even in the extreme case of a single owner-manager firm, we expect that there would be enforcement costs associated with the wealth maximising goal of the owner, especially as the number of employees and the levels of the managerial hierarchy increases.(*)

(*) The similarity and relationship of these two problems should become clearer later. Because this is merely a paper working toward a "new" theory of firms, we shall not deal very much in our model with the problem of firm size. Rather, we are interested in perfecting an analytical framework to to deal with the owner-manager separation aspect of the problem. Once this is achieved, because of the similarity of the problems, the incorporation of the firm size factor should be relatively easy.

2. Managerial Constraints, Owner constraints, and Property Rights.

Given that management and ownership of the firm are "divorced" and that the goals of those respective interest groups are different, a helpful approach to the analysis of the institutional arrangements between the two parties is to view manager's behaviour as an external economic activity. A recent development in the economics of external behaviour has been the introduction of a theory of property rights by Demsetz [1964], [1966], [1967], Milliman [1969], Alchian [1965a], and Cheung [1969], [1970].

An external economic activity we define as any activity by an individual A which affects, positively or negatively, the welfare of another individual B and for which no compensation is made (either to A or to B). The existence of external economic behaviour may be viewed more explicitly, as the conflicts of interests about the use of scarce resources by utility maximising individuals. Property rights, as Alchian has pointed out [1961] [1965] [1967], are a system that is established to resolve such conflicts of interests or, as the literature says, to "internalise" the external behaviour. A property right is the authorization to do a certain activity. In Economics, the purchase of a good (for example a car) is the purchase of a set of property rights to various uses of the good (car). However, the existence of other people with other property rights to activities (or uses of their property) means that one is limited to what one is able or "allowed" to do. Thus my property rights to my car do not include the right to smash it into your car or to drive the car in a legally unlawful manner. If I were to smash into your car this would constitute a violation of the property rights you purchased in regard to your car. You could then "enforce" your property rights by making me pay the

damage to your car.

The concept of private property rights is characterised by two elements: (a) the ability to exclude non-owners from engaging in any of the uses (property rights) which the owner is said to own. In the case of scarce resources, this condition creates the potential for gains from trading or transfering property rights to be had. This ability will be limited by legal and technical considerations, both of which will affect the costs of exclusion and hence the degree to which it will be pursued; (b) the ability to transfer the property rights will allow the realization of the gains from trade. Property which cannot be sold, such as one's voting rights, is not private property. The transferability of private property willagain be limited by the costs of such transfers and these costs will in turn be affected by legal and technological factors.

In addition to the costs of assignment and enforcement of property rights there are information costs involved in determining whether one's property rights have been violated. If any of these costs exceed the potential loss one will suffer when one's property rights have been violated or transferred, it is not worth it to enforce or transfer the rights. As soon as the damaging activity becomes costly enough so that enforcement, transactions and information costs are smaller than the cost of the damage, it is economically rational to "claim" one's property rights. The existence of these costs, then, allows the violator a certain "extra" range of activity which he did not purchase with his property rights. His "effective property rights" include this amount of external activity which he will not have to pay for. The existence of information, and policing costs has the effect of extending the property rights of the person performing the external activity and decreasing the property rights of the person to whom the damage is internal. This will be a crucial point in our analysis of the property rights of activity within the firm.

The relationship of property rights theory to the theory of the firm may be seen when we recognise that there may exist a conflict of interests between owners and managers in the operation of the firm. Owners may be viewed as having purchased (collectively) the property right to have the firm earn maximum profits (in the neo-classical sense). Management's behaviour of maximising their own utility functions, rather than profits, which may yield lower actual profits than is potentially possible, constitutes external behaviour vis à vis the owners and a violation of the owner's property rights. As we would expect, the enforcement by the owners of their property rights involves a cost and hence the "extra range of activity" referred to above will allow management the opportunity to maximise their utility. In fact, it is precisely this extra range which defines managements' opportunity set. Now the information, organisation, and enforcement costs involved in the enforcement of the owner's property rights are likely to be quite high in a diffusely owned firm. This being the case, the manager's opportunity set is likely to be also quite large. There may evolve a formal or informal "assignment" of part of that opportunity set to the property rights of management since it is not feasible for the owner's to enforce their rights for "small" violations. Thus we find few restrictions on company-paid memberships to country clubs although the return to these expenditures is probably less to the "firm" than the cost.

The position and slope of the opportunity set open to managers (we will explicitly define it) will be institutionally determined by the property rights with respect to the firm's potential maximum profit under neo-classical assumptions. The owner-management arrangements will specify these property rights. Furthermore, they will be a direct result of the enforcement costs to owners. Any change in these enforcement costs will alter

the slope and/or position of the opportunity set in the same way as the introduction of a tax or change in any other parameter that enters the production function of the firm. The change in the manager's opportunity set will, in turn, affect managerial decisions with respect to the amount and composition of their (manager's) benefits - both pecuniary and non-pecuniary. As Alchian has put it, management's "incentive to achieve maximum feasible profits for any given level of emoluments depends upon the costs of the owners detecting that full realisability and appropriately rewarding or punishing the manager."(*)

As mentioned in the Introduction, managers may be observed to "behave" differently in different industries, firms and market structures. That is, some managers may be observed to act as profit maximisers while others may seem to freely maximise their own utilities. Yet we can really make no comparisons of managerial behaviour in several firms until the owner-management arrangements (and corresponding managerial opportunity sets) are made known. A firm with few owners and few managers will most likely have lower enforcement costs to owners than a firm with a multitude of owners and managers. Hence, specification of the property rights in regard to profits is likely to favour the owners more in a "small" firm than in a large firm (here, defined in terms of number of owners and numbers of managers), given all of our previous assumptions. Thus, it is highly possible that given the same group of managers their observed behaviour will differ between a small and a large firm not because of any difference in their objective function, but rather due to a shift in their opportunity set as defined by the property rights to decisions within the respective firms.

(*) Alchian [1965], p. 38.

3. A Model of the Firm

Let us now take the above considerations and incorporate them in a model of the firm. We assume that the behaviour of the firm is influenced by the two decision makers: managers and owners. For simplicity, let us assume one manager and let us further assume that we can treat the stockholders' behaviour as if it were that of one homogeneous group. The fact that owners are not a homogeneous group is, of course, an essential real world phenomena with which our model can deal and will be reflected in the costs of enforcement function which we shall introduce.

The firm faces a negatively sloping demand curve and has a revenue function,

$$P = P(X) \qquad (1)$$

$$\frac{dP}{dX} < 0$$

$$R = \left[P(X)\right] \cdot X \qquad (2)$$

when X is output. Without becoming involved in a discussion of whether profit maximising behaviour is a necessary condition for the survival of a firm, we choose to analyse a price searcher because our analysis is concerned with the distribution of income between owners and managers. By treating a monopoly, we are at least dealing with a problem whose quantitative size is likely to be large. Let us turn now to the owner's problem.

As mentioned in the last section, the non-profit maximising behaviour of managers constitutes a violation of the owner's property rights with respect to receiving maximum (in the neo-classical sense) profits. If the owners wish to enforce their property rights they will have to organise, seek legal advice, wage proxy battles, find out to what extent their rights have been violated, and engage in other related activities.

All of this involves a cost. We shall call "enforcement costs" all communication, information, and policing costs involved in the enforcement of the owner's property rights. If we can stipulate some measure of the level of enforcement, perhaps in money units then we expect a cost function, CE, such as in Figure 1. We assume that the marginal cost of enforcement increases with enforcement.(*)

Now the institutional owner-management arrangement will influence the CE function.(**) For example, we would expect CE to vary directly with the number of owners since the cost of communication between 5,000 stockholders, for a given level of enforcement would be less than that for 10,000 stockholders. Similarly the complexity of the managerial activities will affect CE. If the manager is responsible for only a few decisions and influences only one or two economic variables in the firm, then detection by the owners of violation of their property rights is relatively cheap. But as the manager becomes responsible for more decisions, information costs to the owners will increase. Furthermore, technology will influence CE. For example, automated and computerised accounting procedures have reduced the cost of detecting devious behaviour.

Similarly, we can treat enforcement as an activity which accrues wealth to the stockholders. The higher the level of enforcement, the more returns or the more profit of the firm can be captured by the owners.(***) We

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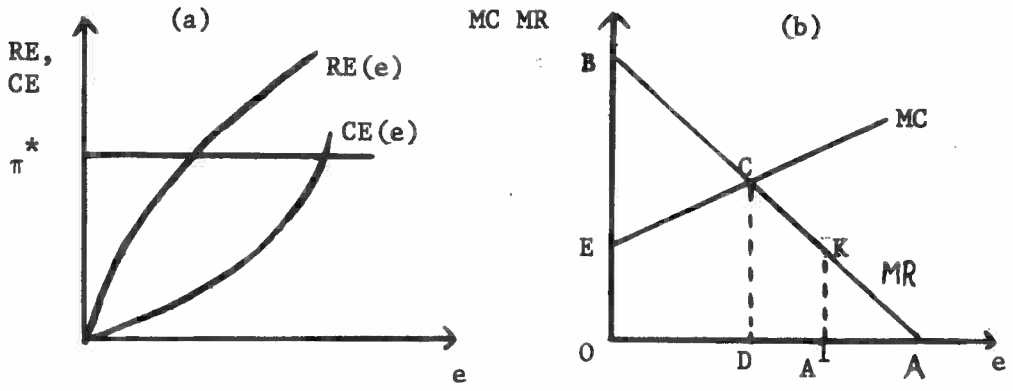
(*) If enforcement is expressed in money units then the marginal cost of enforcement will be constant and equal the unit price.

(**) If e is expressed in money units then influences on CE will be felt by altering the RE schedule.

(***) The way in which this works is examined in part c below.

would expect decreasing returns, or falling marginal revenue from enforcement. Thus, we may represent the two functions, CE and RE as in Figure 1.

FIGURE 1

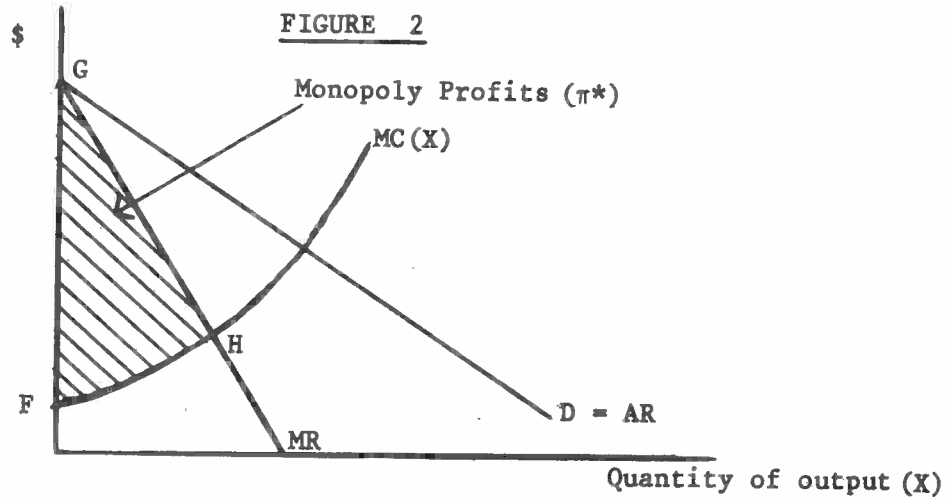


The hierarchiacal managerial structure will be one influence on RE. Thus, if there is an elaborate and complicated managerial hierarchy implying information distortions between levels and conflicts of interest between and along levels in the hierarchy, we would expect that a given level of enforcement would yield lower returns than in a situation where the hierarchy is less complex. We shall return to this function's derivation and position shortly.

A further influence on the RE function will be the supply and demand conditions facing the firm which will determine the size of the obtainable area under the marginal revenue curve in Figure 1(b). This area will be synonymous with the amount of monopoly profits that the firm can earn under wealth maximising conditions. If the firm is a price-taker, we expect this area to be zero. There will be no gains to be had from enforcement. However, none will be desired since we expect the firm to be already acting as a wealth maximiser. The managers operate the firm as a wealth maximising unit because this is the only avenue for

survival. However, a firm facing a negatively sloped demand curve, has the possibility of earning monopoly profits. The familiar determination of these profits is depicted in Figure 2, where area FGH = area BKA'O of Figure 1(b).

FIGURE 2



The owner's objective function is π_0, returns to owners, which is the difference between returns to enforcement and costs of enforcement.

$$\pi_0 = RE - CE \qquad (3)$$

where

$$RE = RE(e) \qquad (4a)$$

$$RE \leq \pi^* \qquad (4b)$$

$$CE = CE(e) \qquad (5)$$

and returns to enforcement are constrained by the neo-classical profit level, π^*. Owners will try to maximise π_0 by setting their choice variable C at the appropriate level. This will, of course, be done as a simultaneous process along with management's solution of its own problem, Anticipating the equilibrium conditions set our later, we can see that owners will not capture all of the neo-classical profits which the firm is capable of earning. In fact, setting RE' = CE', we see that the owners capture OBCD (which netting only EBC) leaving

the managers DCKA'(*). This DCKA' will, as we shall see, form the basis of the managerial opportunity set in which utility can be maximised.

We shall return later to the owner's problem, but let us now turn to the manager's problem. Management is seen as having a utility function whose arguments include factors of production, (Z_1,Z_2), pecuniary income (Y) and leisure (L):

$$U = U(Z_1,Z_2,Y,L) \qquad (6)$$

We have included factors of production into this general specification rather than specific expenses, as suggested by Williamson(**), or specific goals, as suggested by Marris(***). Our model will be able to handle such hypotheses by merely including some hypothesis about the shape of the utility surface. Because, a priori, it seems difficult to discriminate between these hypotheses, I would prefer in this general analysis to leave them unspecified and merely include any or all of the firms factors of production. For simplicity we have restricted the model to two factors.

Pecuniary income is included in the utility function because a priori it is not clear that management may take "inefficienty" home in "cash" or "in kind". This is to say, given the opportunity to increase utility by running up the firms expenses, management may do this by increasing its own "salary" or by discretionary employment of certain factors (other costs). Also, certain of the firm's factors may increase both the pecuniary and non-pecuniary

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(*) The upper limit on RE will truncate the MR of enforcement function at some level, A' say; the area under BKA'O must equal the area FGH of Figure 2 .

(**) Williamson [1963, 1964]; e.g. staff

(***) Marris [1965]; e.g. growth.

income of management. For example, company limousines and other emoluments may not only enhance the manager's "image" (increase non pecuniary income), but also save him private expenditures.

The rationale for leisure (L) in the utility function entails a discussion of the production process and production function used by management. It attempts to allow for the possibility of inefficiency (as viewed by omniscient owners) of management in employing the firm's resources. If we are to drop the assumption of profit maximising behaviour or to allow for optimal choices by management which are not profit maximal then we should have no reason ex ante to expect that departures from the maximum of the profit surfaces are movements down the surface rather than movements underneath.it. That is to say, management may not only be scale inefficient, but also X-inefficient. While Williamson's model has the implication that staff will be employed beyond the efficient point ($\frac{\partial R}{\partial S} < 1$) and that the marginal cost of output is affected, other decisions in the firm seem to imply the use of an efficient production process.

The production process is seen not as a pure technological relationship that says when a certain combination of men and machines get together a certain output results. Rather it is a behavioural relationship determined by the active management, coordination, monitoring and enforcement activities of the managers with respect to the hired inputs. The manager thus may choose not only how much of each factor to employ, but also how "hard" each must work. The enforcement activities of management (exactly analogous to those of owners vis à vis management) will constitute managements' "work" and hence

reduce his leisure. The managerial production function is thus,(*)

$$X = X(Z_1, Z_2, L) \qquad (7)(a)$$

where $\frac{\partial X}{\partial Z_1} > 0$, $\frac{\partial X}{\partial Z_2} > 0$, $\frac{\partial X}{\partial L} < 0$

The neo-classical production function, F, acts as an upper bound on this function so that,

$$X(Z_1, Z_2, L) \leq F(Z_1, Z_2) \qquad (7)(b)$$

Hence, beyond a certain point increases in management's work efforts (or reductions in L) will not increase efficiency in the sense of being on the production surface. The implication of disregarding L in the production function is that the output χ^0 resulting from factor levels Z_1^0, Z_2^0 may only be one member of a set, X', of output levels possible with those factor levels:

$$\chi^0 = g(Z_1^0, Z_2^0)$$

where $\chi^0 \in X'$

and for any $\chi \in X'$, $0 \leq \chi \leq F$.

(*) We may have alternately specified the production function as $X = X(Z_1 Z_2 W)$ where W is managerial work effort which is related to L via some function. For example, L = N-W where N specifies the length of the relevant time period. While this has the attraction of a production function with factors which have positive marginal products, it doesn't seem to add any more to the analysis. Another alternative would have been to put W in the utility function. However, this would involve a "bad" as an argument in the utility function.

Inclusion of L in the production function overcomes this ambiguity.(*)

The above consideration can be depicted graphically and its implications for the cost function of the firm derived. It must be remembered that at this stage we are performing a partial analysis of a more general equilibrium framework. Assume that Z_1 and Z_2 can be purchased in competitive markets at prices P_1 and P_2. Rather than expand along the neo-classical least cost expansion path, management expands along an "income consumption" path where each point is associated (due to the simultaneously determined level of L) with an output level. In Figure 2 below $X_0^{L_1}$, $X_1^{L_2}$ and $X_2^{L_1}$ are production isoquants associated with a given level of L, L_1, and i_0, i_1 and i_2 are managerial indifference curves for Z_1 and Z_2.(**)

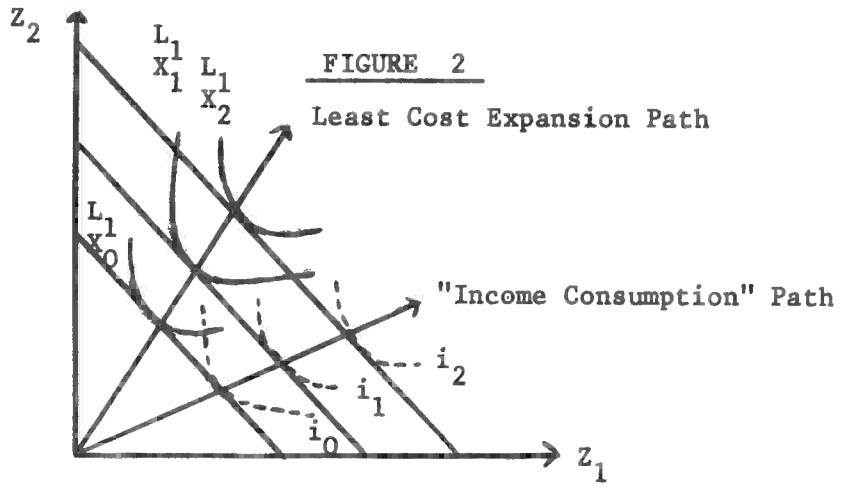

FIGURE 2

Least Cost Expansion Path

"Income Consumption" Path

The corresponding cost curve, C, which results from managements expansion off the least cost expansion path is drawn in Figure 3 and is above the neo-classical

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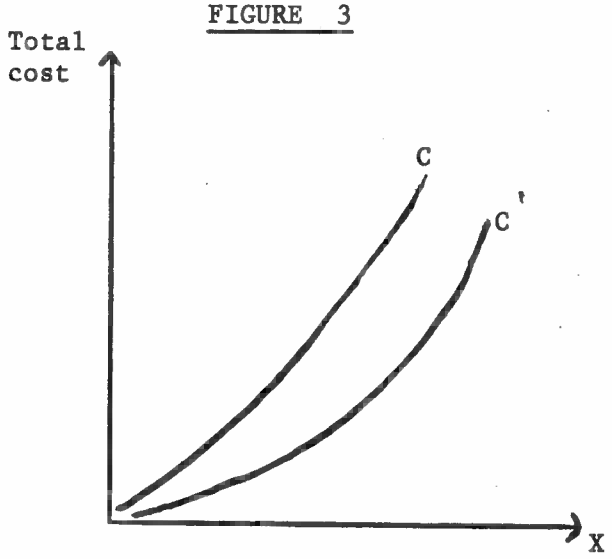
(*) An alternative way of overcoming the ambiguity would be adjustment of the factors for quality of "work effort", but this merely begs the question of why a given factor is not "up to par", and could only be done ex post.

(**) Figure 2 attempts to show the forces affecting the cost function, it does accurately depict the first order conditions to be derived below.

cost function, C', which acts as a lower boundary. The managerial function is above C' for two reasons: (a) management may be off the least cost expansion path and (b) the managerial production function may be below the neo-classical function due to managerial leisure.

FIGURE 3



Management's opportunity set, A, in which to carry out discretionary practices according to its utility function is the difference between π^* and RE(e*)

$$A = \pi^* - RE(e^*) \qquad (8a)$$

where e^* is the optimal level of e for owners. A, as already indicated, will be equal, in equilibrium, to area DCKA'in Figure 1b. Since π^* is already implicitly incorporated into the model through the production function, the demand curve, and the factor prices, we need not introduce it again.in the formal specification of the managerial constraint. That is, given $F(Z_1, Z_2)$, P(F) and P_1, P_2, we know $\pi^* = F(Z_1^* Z_2^*)\ P^*(F^*) - Z_1^* P_1 - Z_2^* P_2$ where the terms with asterisks refer to profit maximal levels. The managerial constraint then is simply to generate enough profits to cover owner's returns:

$$RE(e^*) = X(Z_1, Z_2, L) \cdot P(X) - Z_1 P_1 - Z_2 P_2 - Y \qquad (8b)$$

Alternatively expressed, $RE^* + Y = X(Z_1,Z_2,L)\ P(X) - P_1Z_1 - P_2Z_2$ (8b)
the constraint says that earned profits (the right hand side) are distributed between owners and managers.

We have now completed the specification of the model. Management and owners are seen to simultaneously optimise their objective functions. We have, to a degree, a general equilibrium model. No conjectural variations are postulated and the model is static. Management has as control variables, Z_1,Z_2,L and Y. They are constrained by $RE(e^*)$. Owners simultaneously maximise π_0 with e as their central variable.

The simultaneous optimisation of U and π_0 is an important and crucial difference between this model and other models. Recall for example that in the Williamson and Baumol models, π_0 is an exogenously determined "satisfying" level of returns to the owners. Such behaviour on the part of the owner would imply that no matter what the potential profit level was, the owners would be satisfied with some constant level of π_0. The use of π_0 as an objective function enables us to emplicitly incorporate the concept of enforcement cost in external behaviour into the model. We can thus use the theory of property rights to incorporate the institutional-owner-manager arrangement as a variable in our model. As CE and RE will vary from firm to firm and industry to industry, so will the objective function π_0.

We will discuss in a latter section the determinants of these two functions more formally, but at this stage it is clear that we have at least constructed the analytical framework for comparison of different firms. We can now isolate the variables which affect the distribution of earnings between owners and managers within the firm.

Let us now summarise the model:

Structure

$$P = P(X)$$

$$\frac{dP}{dX} < 0 \qquad (1)$$

$$R = \left[P(X)\right] .X \qquad (2)$$

$$\pi_0 = RE - CE \qquad (3)$$

$$RE = RE(e) \qquad (4a)$$

$$RE \leqslant \pi^* \qquad (4b)$$

$$CE = CE(e) \qquad (5)$$

$$U = U(Z_1, Z_2, L) \qquad (6)$$

$$X = X(Z_1, Z_2, L) \qquad (7a)$$

$$\frac{\partial X}{\partial Z_1} > 0, \quad \frac{\partial X}{\partial Z_2} > 0, \quad \frac{\partial X}{\partial L} < 0$$

$$X(Z_1, Z_2, L) \leqslant F(Z_1\ Z_2) \qquad (7b)$$

$$A = \pi^* - RE(e^*) \qquad (8a)$$

$$RE(e^*) = X(Z_1 Z_2 L)\ P(X) - Z_1 P_1 - Z_2 P_2 - Y \qquad (8b)$$

Behavioural Assumptions

Managers: Max : $\underset{Z_1, Z_2, L, Y}{U}$ s.t. $RE(e^*)$

Owners: Max: $\underset{e}{\pi_0}$

Solution of the model yields the following first order conditions, (*)

(*) The manager's problem can be stated in terms of the Lagrangian, which must be maximised:

$$\Lambda = U(Z_1, Z_2, Y, L) + \lambda\left[X(Z_1, Z_2, L) \cdot P(X) - Z_1 P_1 - Z_2 P_2 - Y - RE\right]$$

The simultaneous owner's problem is stated in terms of maximising RE(e) - CE(e)

$$\frac{dRE}{de} = \frac{dCE}{de} \tag{9}$$

$$\frac{\partial U}{\partial Z_1} + \lambda\left(\frac{\partial X}{\partial Z_1} P + X \frac{dP}{dX} \frac{\partial X}{\partial Z_1} - P_1\right) = 0 \tag{10}$$

$$\frac{\partial U}{\partial Z_2} + \lambda\left(\frac{\partial X}{\partial Z_2} P + X \frac{dP}{dX} \frac{\partial X}{\partial Z_2} - P_2\right) = 0 \tag{11}$$

$$\frac{\partial U}{\partial L} + \lambda\left(\frac{\partial X}{\partial L} P + X \frac{dP}{dX} \frac{\partial X}{\partial L}\right) = 0 \tag{12}$$

$$\frac{\partial U}{\partial Y} - \lambda = 0 \tag{13}$$

$$X(Z_1 Z_2 L) \cdot P(X) - Z_1 P_1 - Z_2 P_2 - Y - RE(e^*) = 0 \tag{14}$$

Conditions (10) - (13) can be rearranged to

$$-\left(\frac{\partial U}{\partial Z_1} / \frac{\partial U}{\partial Y}\right) = \frac{\partial X}{\partial Z_1} P\left(1 + \frac{1}{\eta_X}\right) - P_1 \tag{15}$$

$$-\left(\frac{\partial U}{\partial Z_2} / \frac{\partial U}{\partial Y}\right) = \frac{\partial X}{\partial Z_2} P\left(1 + \frac{1}{\eta_X}\right) - P_2 \tag{16}$$

$$-\left(\frac{\partial U}{\partial L} / \frac{\partial U}{\partial Y}\right) = \frac{\partial X}{\partial L} P\left(1 + \frac{1}{\eta_X}\right) \tag{17}$$

where η_X is the elasticity of demand. In economic terms (15) and (16) require that the marginal rate of substitution between Z_1 or Z_2 and pecuniary income ($MRS_{Z_i Y}$) be equal to the price of Z_1 or Z_2 adjusted for the contribution of Z_1 or Z_2 to total revenues, the marginal revenue products of Z_1 or Z_2, MRP_{Z_i}. That is

$$MRS_{Z_1 Y} = MRP_{Z_1} - P_1 \tag{15'}$$

$$MRS_{Z_2 Y} = MRP_{Z_2} - P_2 \tag{16'}$$

Thus, management's shadow price on its factors takes account not only of the price such inputs fetch in the market, but also their marginal contribution within the firm to revenues. The comparison of (15') and (16') to a neo-classical optima is obvious. Moving P_1 to the lefthand side of (15') we see that

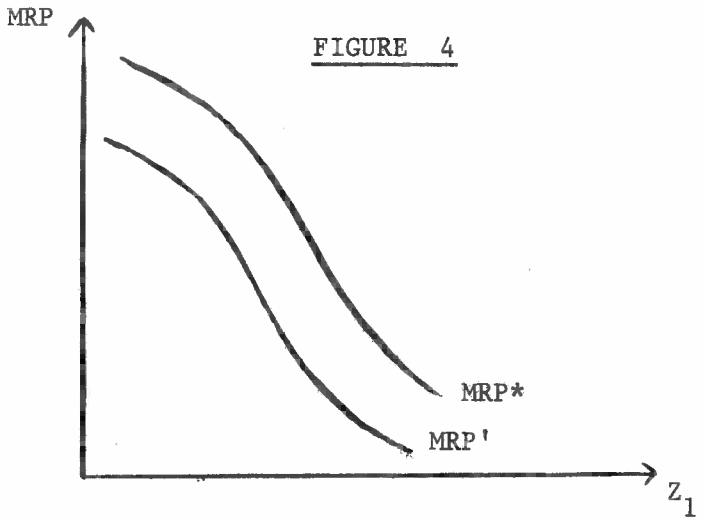
$$MRS_{Z_1Y} + P_1 = MRP_{Z_1} \qquad (15')$$

and since $MRS_{Z_1Y} < 0$, the "price" of the factors are lowered and they are employed beyond the neo-classical optima on a given MRP schedule. But the MRP_Z schedule represented in (15') is not the same as the one facing a neo-classical producer. This is because of condition (17) which can be re-written as,

$$MRS_{LY} = MRP_L \ (< 0) \qquad (17')$$

That is, that the marginal rate of substitution of management of leisure for pecuniary income be equal to the marginal revenue product of leisure (which is negative). This implies that for any positive value of L, the MRP schedules of Z_1 and Z_2 will be below the schedules for a neo-classical entrepreneur. Figure 4 depicts this.

FIGURE 4



MRP* represents the neo classical MRP_{Z_1} schedule while MRP' represents the "managerial" MRP_{Z_1} schedule with positive values of L. The implication of this

shift is that a given movement down an MRP schedule represented by increased employment of Z_1 may be offset by the downward (and leftward) shift of the curve.

This may be made clearer by representing condition (15') and (16') with the diagram in Figure 5.

FIGURE 5(a)

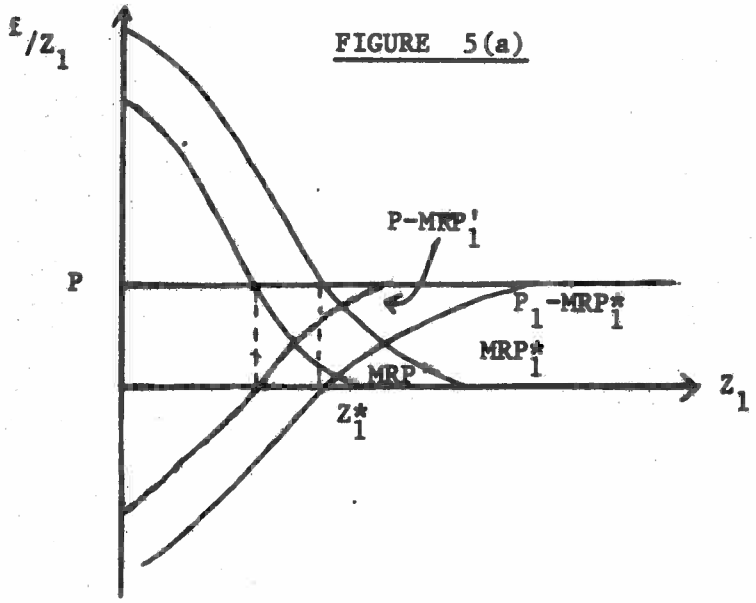
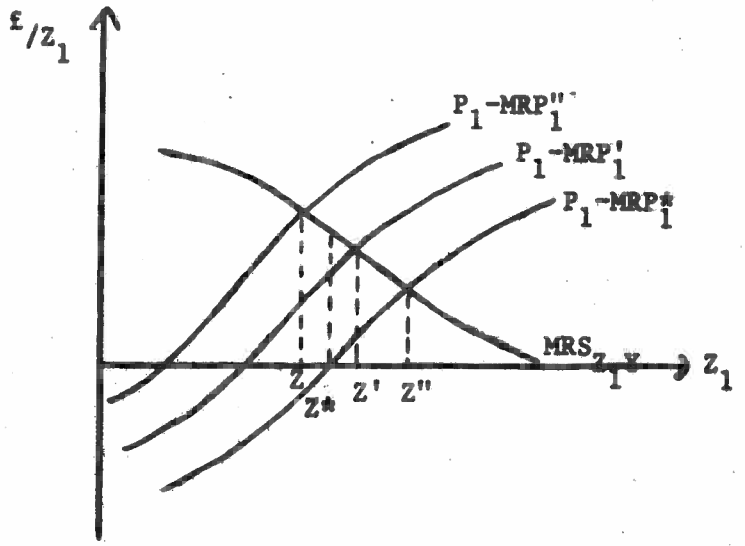


FIGURE 5(b)



In Figure 5(a) we depict the derivation of the P-MRP schedule, the right hand side of (15') or (16'), after we have multiplied both sides of (15') and (16')

by minus one. There will be a different P-MRP schedule for each level of L and an upper limit on these curves is, of course, P-MRP*, the neo classical curve. Z_1^*, where P-MRP* = 0 is the neo-classical level of Z_1^e. Now in Figure 5(b) introduce our utility maximising manager's $MRS_{Z_1 Y}$ schedule which is negatively sloping under the usual assumptions. It can be seen that if the manager were to work (or play) as hard as a neo-classical manager he would employ more of Z_1 (or Z_2), namely Z_1''. For the P-MRP' schedule as drawn he employs less Z_1 and for other increases in L, P-MRP shifts further to the left introducing the possibility of employing actually less Z_1 or Z_2 than a neoclassical firm's Z*. If both Z_1 and Z_2 are less than the neoclassical optima the firm, measured in almost any way, will be smaller than the neoclassical one. This result is at variance with most other "new" theories of the firm which predict more of a given factor being employed and larger firms than those expected under neoclassical assumptions. The difference is again attributed to inclusion of managerial leisure in the utility function and in the production function.

Alternatively, we can partially represent the equilibrium conditions in Z_1, Z_2 space. This will, however, require representing the constraint in Z_1, Z_2 space, for given levels of L, Y, and RE. Let the constraint be C. Then,

$$C = X(Z_1, Z_2, L^*)\ P(X) - Z_1P_1 - Z_2P_2 - Y^* - RE^*$$

and $$dC = \left\{ \frac{\partial X}{\partial Z_1} P + X \frac{dP}{dX} \frac{\partial X}{\partial Z_1} - P_1 \right\} dZ_1 + \left\{ \frac{\partial X}{\partial Z_2} P + X \frac{dP}{dX} \frac{\partial X}{\partial Z_1} - P_2 \right\} dZ_2 = 0$$

$$(18) \qquad = \{ MRP_{Z_1} - P_1 \}\ dZ_1 + \{ MRP_{Z_2} - P_2 \}\ dZ_2 = 0$$

The expression dC = 0 will represent the constraint in Z_1, Z_2 space for given levels of L, Y_1 and RE. Since Y and RE are fixed, earned profits which are

$Y^* + RE^*$ are also fixed, so that representing the constraint in Z_1, Z_2 space will yield iso-profit contours; a ceteris paribus increase in Y^* or RE^* or both will shift the constraint in Z_1, Z_2 space.

Note that the constraint has the slope,

$$\frac{dZ_2}{dZ_1} = - \left\{ \frac{MRP_{Z_1} - P_1}{MRP_{Z_2} - P_2} \right\} \tag{19}$$

so that $\frac{dZ_2}{dZ_1} > 0$ when (a) $P_1 < MRP_{Z_1}$, $P_2 > MRP_{Z_2}$ or

(b) $P_1 > MRP_{Z_1}$, $P_2 < MRP_{Z_2}$ (20)

and $\frac{dZ_2}{dZ_1} < 0$ when (c) $P_1 > MRP_{Z_1}$, $P_2 > MRP_{Z_2}$ or

(d) $P_1 < MRP_{Z_1}$, $P_2 < MRP_{Z_2}$

Assuming decreasing returns to scale, Figure 6 represents the profit hill for a given level of L in three dimensional space. Figure 7(a) represents the iso-profit contours in two space. These contours, then, are contours of the constraint. The exact position of the profit hill will, of course, depend on the position and shape of the production surface and the prices of Z_1 and Z_2. Furthermore, since managerial "work" affects the efficiency of the factors through L, the production surface (not drawn) will be higher or lower for varying levels of L and consequently shift the profit hill. The meaning of Figure 7(a) with reference to the manager's problem may be clearer by looking at Figure 7(b), a more familiar diagram. If the manager were a strict profit maximiser, the isoquants would represent "indifference" curves for the employment of the firms factors. The firm would expand along the least-cost-expansion-path (L.C.E.P.) until profits were at a maximum, Were the manager simply a consumer of Z_1 and

Figure 6

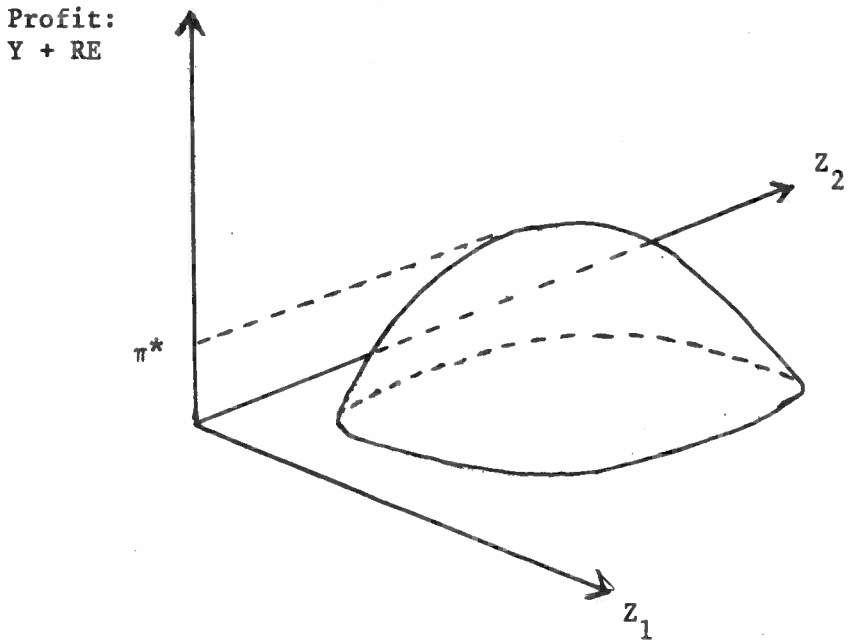
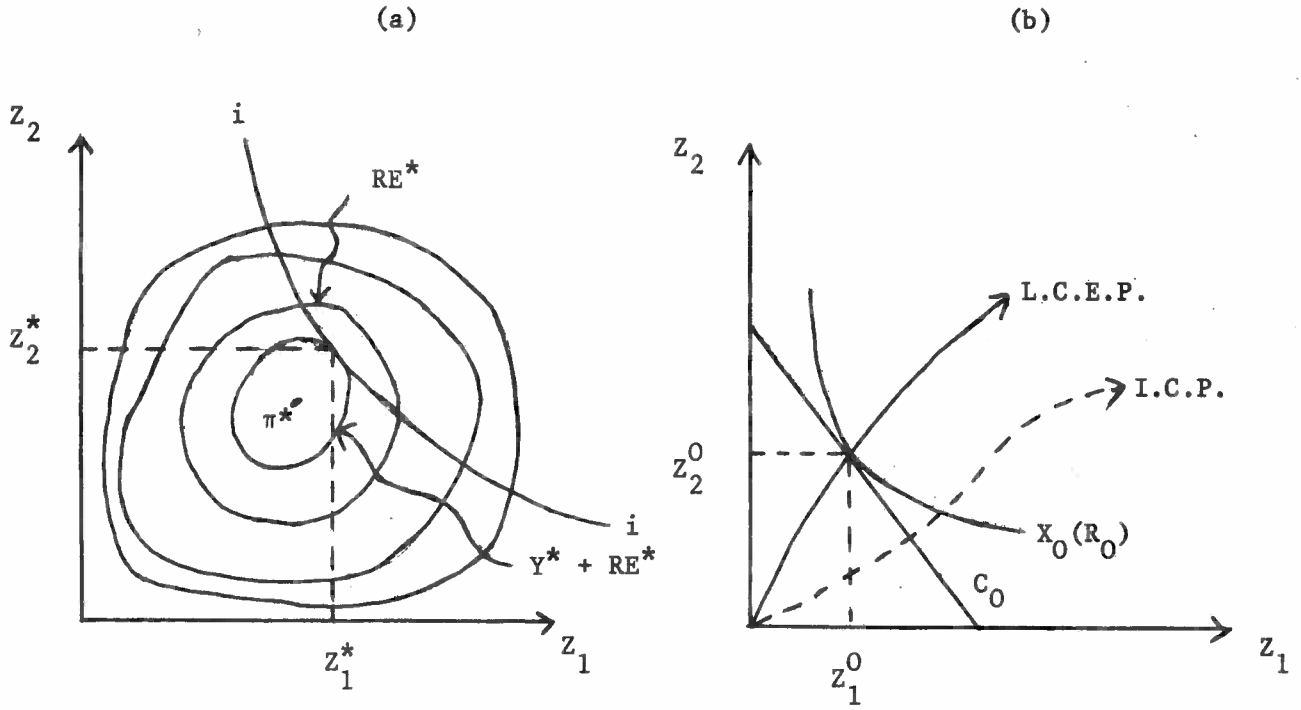


Figure 7



Z_2 and faced the same prices, he would expand along his income-consumption-path until his income were expended. Our manager-consumer, however, is a mixture of both. Not only can be buy goods, Z_1 and Z_2 at the given prices P_1 and P_2, but he can also "put them to work" producing saleable goods (X) which can be traded for still more Z_1 and Z_2. The productivity of the particular Z_i's will lower the "prices" of both by the value of the marginal product $(P_i - MRP_i)$. For a given level of earned profits, therefore, Z_1 and Z_2 may be varied in such a way as to "pay for themselves", either directly as when $P_1 < MRP_{Z_1}$ or through "cross-subsidies", as when $P_1 < MRP_{Z_1}$ and $P_2 > MRP_{Z_2}$ (Z_2 being subsidized), so that profits stay constant. For an exogenously given level of RE* and the simultaneously determined equilibrium level of Y*, the optimal levels of Z_1 and Z_2 are determined by moving along the Y* + RE* iso-profit contour until it is tangent to an indifference curve (Figure 7a) where the 1st order conditions ((10) and (11)) are met since: $MRS_{Z_2Z_1} = - \dfrac{MRP_{Z_1} - P_1}{MRP_{Z_2} - P_2}$

The second order conditions will require that the manager be on the concave portion of the appropriate iso-profit line which we would expect since were he to be on the convex portion, he could have more of Z_1 or Z_2 or both and move to a higher indifference curve. For the sub-programme represented in Figure 7(a) the second order conditions would require that the iso-profit line be concave to the origin at $\alpha+$ equilibrium. Now,

$$\frac{d^2Z_2}{dZ_1^2} = -\left\{\left[MRP_{Z_1Z_1} - MRP_{Z_2Z_1}\left\{\frac{MRP_{Z_1} - P_1}{MRP_{Z_2} - P_2}\right\}\right] \cdot \left(1/(MRP_{Z_2} - P_2)\right)\right\}$$

$$= -\left\{\left[MRP_{Z_1Z_1} - MRP_{Z_2Z_1}\left(-\frac{dZ_2}{dZ_1}\right)\right] \left(1/(P_2 - MRP_{Z_2})\right)\right\}$$

Assuming $MRP_{Z_1Z_1} < 0$ and $MRP_{Z_2Z_1} > 0$, and since $\dfrac{dZ_2}{dZ_1} < 0$, a sufficient condition for

$\frac{d^2Z_2}{dZ_1^2} < 0$ is condition 20(c) which implies "over" employment of Z_1 and Z_2 in relation to where a neoclassical employer would be for the same amount of profits since $P_i > MRP_{Z_i}$. However, whether any particular Z_i is greater in equilibrium than a neoclassical optimum will depend on the equilibrium level of Y and particularly L.

C. Aspects of the Enforcement Mechanism

Having analysed the managerial-owner interaction in some detail, it may be helpful to examine the owner-manager interaction again. There are some ambiguities remaining in the model and it is toward clarification of these aspects that this section is intended to work. Specifically, the way in which "enforcement" operates needs to be analyzed. The activity of enforcement is obviously not a homogeneous activity and can take many guises and forms. The range of possible enforcement techniques available to any owner or set of owners is largely determined by the technology of the society, the law, and the imagination of the owner. The choice of techniques, as previously mentioned, is an economic decision regarding the employment of these scarce (i.e. costly) techniques. The cost of using any given technique, or the relative marginal net returns of using any technique can be expected to vary according to the institutional and legal framework of ownership. We address analysis in this section to what general techniques are available, and the costs and rewards to owners and managers of such techniques.

1. "Surveillance" Strategies in the Firm

In most externality cases there are two basic strategies available to owners for alleviating the violation of their property rights: "surveillance" and "ownership". Under "surveillance" the owner gathers information of violations in particular instances and then prosecutes violators either through private

action or through the courts. Under "ownership" one party involved in the externality simply buys out the property interests of the other. Using surveillance the owner of a cornfield may employ a patrolman to detect a neighbouring cattleman's wandering cattle which damage the corn or otherwise tresspass and violate the farmer's property rights. Action may then either be taken privately between the cattleman and the farmer (e.g. a fence erected, wandering cattle be shot, compensation for damage, etc.) or the matter may be settled in the courts. Alternatively, the farmer may buy the cattle ranch and "internalize" the externality by adjusting the size of the herd and cornfield and erecting a fence or some other kind of preventive device.(*) Or, the cattleman may buy out the farmer and take similar action. In either case the "ownership" strategy has been adopted.

a. Job Threats to Managers by Owners

The use of the general technique of surveillance by owners of the firm could possibly be at two levels. Most generally they could gather information on the relative reported profitability of their firm in the industry. Presumably, they need merely gather information on the performance of other firms since they would be receiving dividends or other pecuniary rewards from their investment. The actual monopoly rents earned by the firm, which are distributed between owners and managers will be larger than the owner's share.

(*) The ownership strategy, sometimes referred to as the "merger solution", provides added incentives to the owner to reap gains by reallocating the previously misallocated resources now at his command. However, there may be just as many adjustment costs facing one owner as there were facing two (which lead originally to the externality) so that no "full" adjustment will take place.

However, the owner's concept of relative profitability will be in terms of the returns they receive relative to the returns which other firms yield their respective owners. The owner's of these other firms face a similar problem, but the inter-firm profitability comparison using dividend or "reported profits" figures is still a logical, albeit imperfect, criteria for decision making. If ownership shares are traded in a market then owners have a source of cheap information on the relative profitability of their firm to other firms in the industry and other investments in general. If the market indicates that the firm's performance is below those which can be expected in the industry, say, this would tell owners that (a) their firm's profits (or performance) are relatively low and (b) it is in fact possible to do something about it. It is sometimes argued that perfection in the capital market will ensure that any inefficiency that may arise through a lack of incentives due to imperfections in the product market would be erased. However, the costs of enforcing property rights and detecting managerial discretion are determined in part by technology and will be the same to new owners of the firm as they were to the former. (Unless the new owners have developed some technological innovation.) The "market" for firms is not some deus ex machina which, with the waving of a hand, can erase inefficiency; it is rather an arrangement for the allocation of the ownership rights to firms to people who think they can do "better" - i.e. more efficiently enforce their rights with management - than the previous owners. If it is reasonable to expect that enforcement of ownership rights in one firm can be carried out similarly to those in another firm in the same industry, then the firm with the lower reported profits, ceteris paribus, would register a lower price. That is to say that the lower price reflects in effect a lower rate of return on enforcement

in the less efficient firm.(*)

It is important to emphasize again that the market will only provide information to owners about the gains from possible actions with regard to their property rights. What actions they take are another matter, although as argued above, some action must be profitable for owners, otherwise the market will not generate such signals. On the basis of the information which owners can gather from the firm's valuation in the market (relative profitability) they could in principle make the management an all-or-nothing offer to either increase the returns to owners (e.g. dividends) or else lose their jobs. If the market's information is correct this implies that management's opportunity cost of remaining in its present employment, measured by the utility level it could obtain in the next best alternative employment (presumably in the industry), is below the benefits it is currently receiving. Management's bargaining position, and hence the position of any potential new (replacement) management, is such that it will probably accept the offer. The cost to the owners of making such an offer would be minimal, although the costs of organizing and deciding to actually make the offer may be substantial.

b. The Implications of Legal Arrangements: Partnerships and Corporations

The ability, and hence the cost, of making such offers will not be independent of the legal liability of management in any particular situation.

(*) The above discussion of the market for firms is not meant to imply that these are the only operating forces.

For example, under the law of partnership, each partner must meet the debts of the company up to the limits of his financial ability. Thus, while management may have been contracted to earn maximum profits or to at least keep the company solvent, legal liability for debts rests with the owners in the absense of any private contractual agreements between owners and managers. So any de facto ownership of the firm in the hands of management can have a considerable external effect on owners and, as Demsets has pointed out, "would make it exceedingly difficult for entrepreneurs to acquire equity capital from wealthy individuals".(*)

However, such de facto ownership by management in a partnership arrangement is likely to be small for two reasons. Firstly, as previously mentioned, the incentive of owners to enforce are quite high since any mismanagement affects their wealth substantially due to the legal liability of the partners. Also, because in practice, partnerships are owned by a small number of people (**) losses and gains of the company are shared among relatively few people. Secondly, since enforcement costs are generally a function of the number of owners, smaller numbers mean lower enforcement costs. In practice, partnerships are managed by the partners so the only divergence of interests that arises is between or among owners. If all share equally in the profits or losses, the only conflict that would arise would be in the presence of uncertainty or lack of information about optimal strategies. Under U.S. partnership law, each partner has a right to manage the business, unless otherwise agreed, and any disputes are settled by majority rule. Also, each partner is an agent of the firm and has authority to make contracts and enter into transactions on its behalf.(***)

(*) Demsetz 1967 , p. 358

(**) Under the law of partnerships in the U.S. unless otherwise agreed all partners, regardless of their capital investment, share equally in profits and make equal contributions to losses. Houghteling and Pierce, 1963, p.674.

(***) Houghteling and Pierce, op.cit., p. 674-5.

In general then, the legal structure of partnerships is such that we would expect little or no divergence between the wishes of contracted non-owner managers and any such divergence that did arise could be easily corrected through threats to remove the management. When no non-owners are involved, the owner-partner-manager's interests are expected to be harmonious except in the face of uncertainty in which case the different partner's subjective estimates of what is best may lead to conflict. That is, the RE function is likely to be located quite high and the CE function quite low. Surveillance in the case of partnerships is likely then to be successful in leading the firm to a profit maximising position, unless de facto ownership by contracted management is possible in which case the firm's existence is unlikely to be viable in the long run because of the owner's liability: the partnership will disolve or the partners may sell out to management.

By contrast, the limited liability corporation is an alternative ownership arrangement which was originally established to reduce the effects of manager-owner (or owner-owner) externalities. In general, the liability of each shareholder in the U.S. is limited to the amount he paid for his stock so that if the assets of the corporation prove insufficient to pay creditors, he is not personally responsible for the deficit. Management is by a board of directors who are elected by the shareholder, usually at an annual meeting. Shareholders usually do not participate in management decisions except to vote on major issues such as mergers or new stock issues. Regarding the implications for surveillance, information on the firm's performance is guaranteed under the law since each member has the right to inspect the books of the corporation so long as he gives "reasonable notice" and his examination is for a "reasonable purpose". Since the costs of collecting this information are borne by the stock-holder, an external C.P.A. is usually contracted to prepare a report for all owners. The directors are personally liable for misappropriation of corporate

assets unless it can be established that they acted in good faith. Disagreements on management policies and dissatisfaction with the performance of the firm can be registered by shareholders in the first instance by trying to vote in alternative candidates, (the job-threat-to-management-surveillance-strategy). However, since the costs to each owner are high relative to the expected impact his vote will have on the outcome,(*) unless he controls a large percentage of the voting stock, the incentive to vote is low. To partially overcome this costs aspect, the law of corporation provides for proxy votes so that an owner does not have to attend the annual meeting in order to vote. In the U.S., stockholders can in some circumstances enter into "voting trust" agreements to pool their votes in order to increase the impact of their votes. In some states, voting trusts are strictly regulated and a few states have outlawed them entirely.

There is not even a legal compulsion for management to pay dividends. While each shareholder has the right to receive his share of any dividends declared by the corporation (subject to the rights of preferred stockholders) there is no absolute legal right to receive dividends even when the corporation has earned a profit. As a general rule the directors have sole authority to determine whether a dividend will be declared. If the owners are aggrieved their only alternative is to vote a new board of directors in, although the courts will intercede to compel the directors to declare a dividend in certain rare and exceptional cases(**).

(*) The expected value of a vote is the marginal increase in the probability of one's candidate being elected as a result of one's vote times the marginal gain in wealth or dividends one would sustain as a result of one's candidate being elected.

(**) Houghtcling and Pierce, p. 764. c.f. Dodge v. Ford Motor Co. Supreme Court of Michigan, 1919, 204 Mich. 459, 170 N.W. 668.

So, generally the only recourse of unhappy owners in a corporate environment is either to sell one's share in the enterprise (although there are legal restrictions on this in some circumstances) or to attempt to oust the management via the voting process. If a corporation sustains injury as a result of the "negligent or wrongful" activities of one or more of its directors it must bring suit in order to recover damage. (Who brings suit in the name of the corporation is unclear.) In the event that the corporation fails to act, any stockholder may bring action, but if he is successful anything recovered goes into the corporate treasury to be used solely for the benefit of "the corporation", although court costs may be recovered. So again, unless a stockholder has a majority of the voting shares, or can muster a collusion of other owners, or the damage to the company is very substantial, the incentive to take court action and enforce "ownership rights" is small. In essence, then, shareholders are lenders of capital and not owners; what they de facto own, given the costs of any action, are their shares, and not the corporation.

The rigth of a shareholder to sell his interest without first obtaining permission from fellow owners, as must be done under the law of partnership, provides a means by which the shareholder can "get out" if his and management's preferences do not harmonize. The cumulative effect of such action would in the long run lead to increased harmony of owners and managers (given the technology of enforcement) as those shareholders who remained in the corporation or who bought their way in could be expected to have revealed their preference for the management's performance.

The above rather tangential discussion of the rights and liabilities of owners and managers in two institutional arrangements was undertaken merely to

illustrate the implications of legal and institutional arrangements on the enforcement process. We have discussed these two types of institutions in the context of surveillance with job-threats to management. We turn now to another kind of surveillance technique which is related to management's security but in a less direct way.

c. Enforcement via Changes in Perceived Factor Prices

One possible enforcement technique of owners would be to change the factor price ratios as seen by the manager so as to force the manager onto the least cost expansion path. The activities of the owners then may mean that "excessive" consumption of particular factors carries a risk for the manager. The risk means that those goods which he is consuming in excess will have a risk discount factor added to their price making them more expensive relative to other kinds of consumption. Thus the price of Z_1, P_1, will become $\hat{P}_1$, where $\hat{P}_1 > P_1$; $\hat{P}_1$ is the perceived price of Z_1 by management. If, in relative terms, $\left(\frac{\hat{P}_1}{\hat{P}_2}\right) > \left(\frac{P_1}{P_2}\right)$, (the price of Z_2 will similarly be affected) the management will substitute Z_2 to Z_1.

The way in which surveillance activities of owners actually changes the factor prices could in theory be an overt strategy of owners where they would go around looking for suspicious expenditures of the firm, or could be a by-product of the previously mentioned job-threat strategy. In the former, management may have to justify expenditures to owners who had examined the books. This may or may not be easy and depends upon how much knowledge of the "production function" owners have (or are willing to spend money to find out about). Thus, what may appear to be "excessive" capital expenditures on some new vintage machines, would be easy for management to justify and more difficult for owners to establish as excessive. In contrast, managerial perquisites and

expenditures on "good will" will be harder to justify and thus carry higher risks. For this reason we would rarely expect to find entries in the books entitled, say, "2 Trips to the Bahamas".

As a by-product of the job-threat strategy, those discretionary expenditures which have relatively high per-unit prices will have relatively high impacts on potential profit earnings. They are likely to be more "visible" then so that their consumption carries more risk than others. Management is thus more likely to spend its opportunity set on relatively low price per-unit items like fancy stationary, pretty-yet-less-productive secretarial staff, thick rugs on the office floor, etc., rather than higher per-unit priced items like company yachts and jet planes. As a corollary if managers are salaried, their time does not carry an explicit per-unit price, although some price could be computed by estimating some expected hours worked total for the year. But since managerial working hours are not established (who would do it? Who would enforce it?) the "risk" of going home "early" is relatively low. The marginal impact of marginal managerial changes in leisure or productivity is probably very costly to discover, although we would expect the manager to be more aware of the quantitative order of magnitude of the trade-off than the owners.

In general we would expect that the more surveillance (or e) that owners engage in, the more risky certain kinds of behaviour become for the manager. That is to say,

$$\hat{P}_i = \hat{P}_i(P_i, e)$$

where, $\dfrac{d\hat{P}_i}{de} > 0 \quad , \quad \hat{P}_i > P_i$

The exact form which the $\hat{P}_i$ function might take we will choose to leave unspecified in this general model. However, without loosing much generality we could write this in the general form,

$$\hat{P}_i = P_i + r(e)$$

where r is the value of the risk incurred and which increases with e. The variable r could be interpreted as the loss in utility due to the fall in the expected value of utility as a result of the possibility of being sacked.(*)

$$r = U - E(U)$$

$$\text{where} \quad E(U) = U \quad (1-\rho(e))$$

$$\text{so,} \quad \hat{P}_i = U \cdot \rho(e) + P_i$$

and $\rho(e)$ is the probability of being thrown out of office. We postulate that increased enforcement would increase this possibility, i.e.

$$\frac{d\rho}{de} > 0.$$

This would establish a direct link between the enforcement activities of owners and the activities of managers. The effect of this strategy would be to change all the prices in the model, including the shadow price on leisure and pecuniary income, to $\hat{P}_i$'s so that each $\hat{P}_i$ is now set for a given level of e which is simultaneously determined in the owner's problem.

A ceteris paribus increase in e may increase the relative price of Z_i, say. The effect on consumption is, in general ambiguous. Diagrammatically this can be shown with the aid of figures employed earlier. The increase in e

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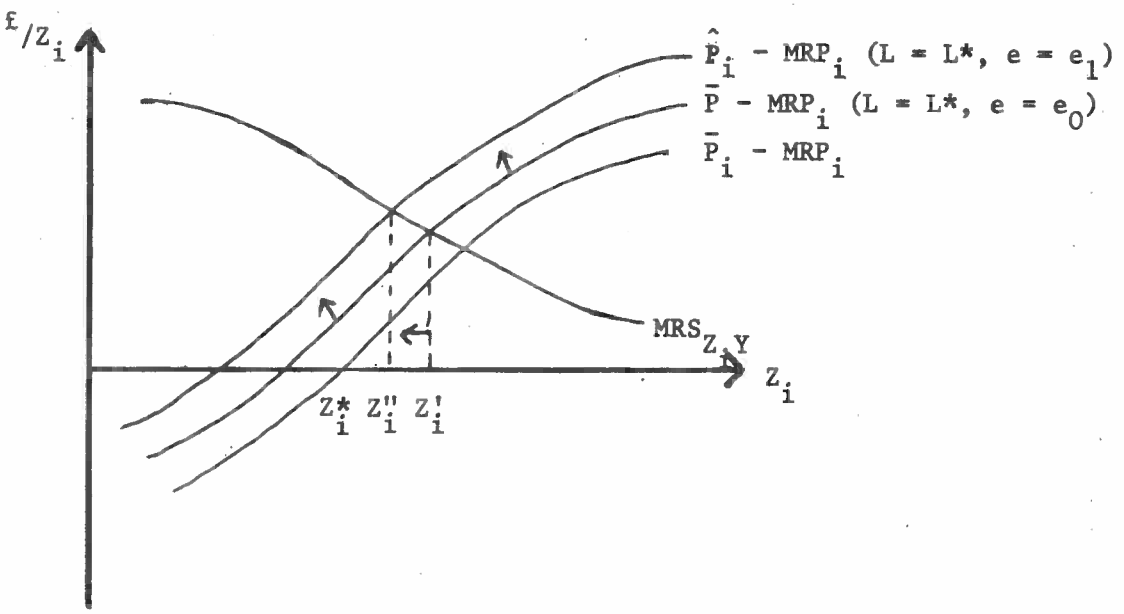
(*) Information costs seem to be high in the department, George Yarrow has taken a somewhat similar approach in his "Managerial Utility and Maximisation Uncertainty" Warwick Economic Research Paper $20, 1972

has two effects. In Figure 8, which is a partial diagram, we show the first. The price of Z_i increases from $\bar{P}_i$ to $\hat{P}_i$, say. This will have the effect of shifting the P_i - MRP_i schedule up and to the left. If managerial consumption of Z_i had been excessive, i.e. beyond the neo-classical optimum, this would lead managers closer to a neoclassical optimum (Z_i^*) viz à viz Z_i, by reducing consumption from Z_i' to Z_i''. Had managers been consuming <u>too little</u> Z_i by comparison with neo-classical standards, an increase in P_i would move them <u>away</u> from the optimum. This may be overcome in considering the second effect of an increase in e, the effect on leisure and the other factor Z_i.

FIGURE 8



Consider leisure first. An increase in the price of one factor to management will firstly lower the relative price of leisure and tend to increase the equilibrium amount. This, in turn, would cause a shift in the P_i - MRP_i schedule in the same direction as the increase in price, thus re-enforcing the tendency to reduce employment of Z_i. However, increased e may

also increase the risk of managerial inefficiency caused by leisure. Departures of the productivity of factors from what is possible will therefore be more risky for management thereby increasing the "price" of leisure. This could be measured in terms of foregone productivity or measured in foregone profits. Thus, while the relative price of leisure to Z_1 may have decreased, the absolute price will have increased. Profitability will therefore be substituted for leisure. This has the effect of shifting the MRP_i schedule up toward the MRP_i^* schedule of a neo-classical firm. This in turn will ceteris paribus lower the $P_i - MRP_i$ schedule. When considered simultaneously with changes in $\hat{P}_i$ this will dampen any upward movement of the $P_i - MRP_i$ schedule. In fact, the downward shift in MRP_i due to changes in leisure may offset any upward shift due to the increase in P_i so that Z_i actually increases as a result of increased e. These phenomena are depicted in Figures 9a,b,c.

The threat which management perceives and which we are viewing as affecting the perceived prices of the firm's factors operates primarily through the performance (e.g. profitability) of the firm. The "supply curve" of a factor to management is effectively the $\hat{P}_i - MRP_i$ schedule, which has two components, the "price" and the "productivity" of the factor. If a manager's job is under threat due to low productivity or low profitability, the effect which the increased e has, is to shift the schedule in such a way as to lead to a more "optimal" employment of Z_i. If Z_i is underemployed, $MRP_i > P_i$ and if Z_i increases output increases. In this case the $P_i - MRP_i$ schedule shifts down. This is quite compatible with the "price" of Z_i relative to the price of some other factor Z_j, increasing.

Figure 9(a)

Effects of Increased e with $\hat{P}_i$ constant (L changing)

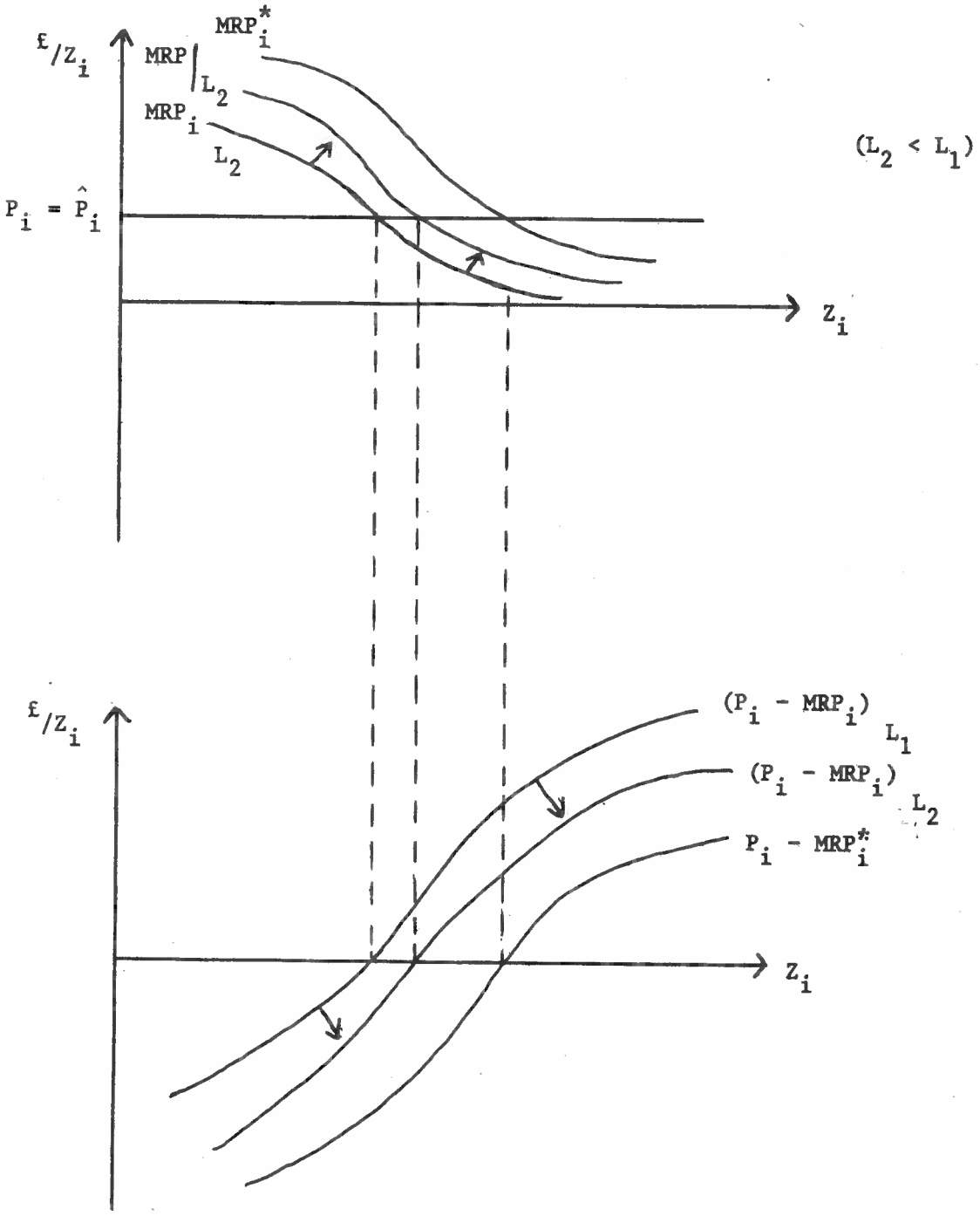
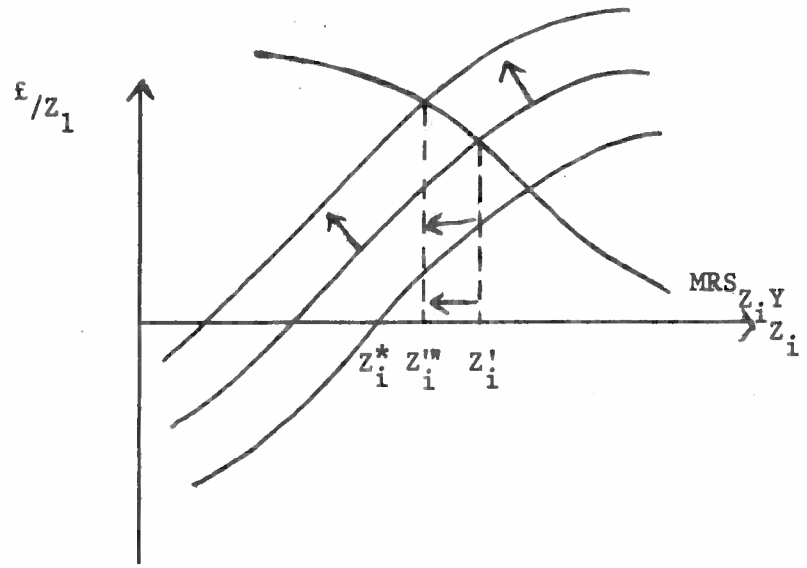


Figure 9(b)

Possible Effects of Increased e with both $\hat{P}_i$ and MRP_i changing j

(Z_i decreasing)



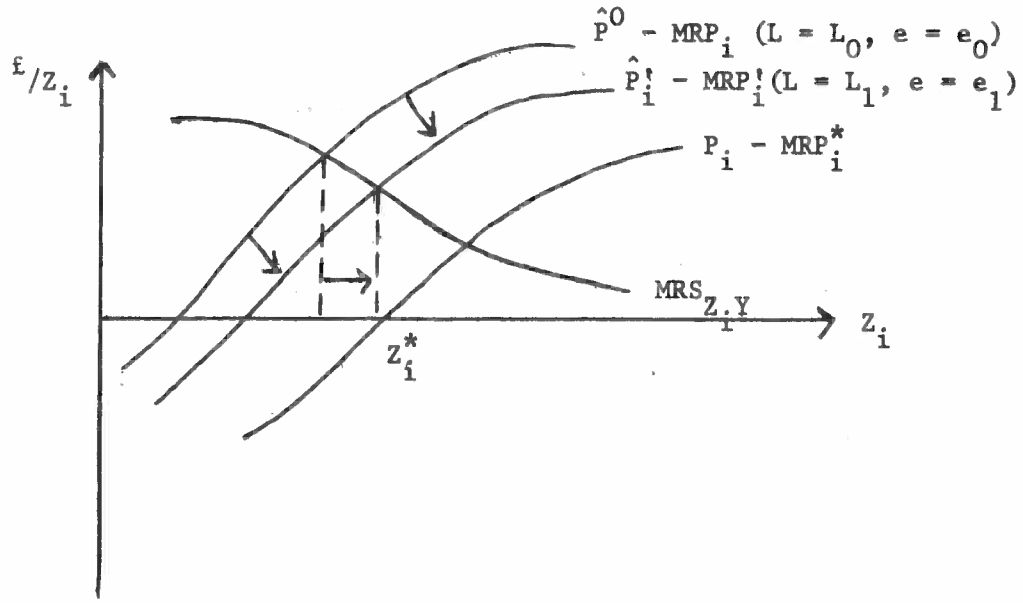
$(\hat{P}^0 < \hat{P}')$

$(L_0 < L_1)$

Figure 9(c)

Possible Effects of Increased e with both $\hat{P}_i$ and MRP_i changing j

(Z_i increasing)



Considering the effects of increasing $\hat{P}_i$ on the other factor Z_j, we note that firstly an increase in the relative price of Z_i will lead to an increase in the consumption of Z_j. However, the production interactions may tend to offset this. An increase in Z_j will shift the $P_i - MRP_i$ schedule to the right as MRP_i increases with Z_2. This will dampen the decrease in Z_i consumption. However, the shift in Z_i consumption has an effect by itself on consumption of Z_j by shifting the $P_j - MRP_j$ schedules to the left (in the case where increases in $\hat{Z}_i$ have a positive effect on MRP_{Z_j}). This will dampen the increase in Z_j consumption and may offset it so that again the result is ambiguous. While normally we would expect the interactions to be such as to leave the demand curves for Z_i and Z_j negatively sloping, the complicating additional effects of leisure will decrease our confidence in this hypothesis.(*)

We have said that the manager will be sensitive to increases in e which threaten his security, reputation, and expected future income in the firm. Yet owners are not interested in an improved performance of the firm simply because they get utility from owning a more efficient firm, although this may be the case. Rather, as postulated earlier, they are interested in the rewards which they receive from this firm. The increase in efficiency may sometimes be a voluntary response of management whose preferences have changed in favour of more pecuniary income Y. The threats on management's security, however, are a direct result of the owner's dissatisfaction.with the returns on their investments. Management's induced increase in profitability, outlined above, will be matched by a corresponding increase in the returns given to owners.

(*) The analysis just engaged in would also apply for the comparative statics of an exogenous change in P_i from the factor market, except that the security effect on L would be absent.

This is the basis for writing the RE function as dependent on the level of e: RE(e). Viewed differently, an increase in e not only affects the shadow prices of the Z_i's and leisure, but also pecuniary income, Y. This completes the mechanism by which owner's surveillance and enforcement activities interact with managerial discretion.

We pointed out, however, that changes in the shadow prices of the arguments in the managerial utility function may take place either as a result of overt action on the part of the owners trying to directly influence managerial consumption or by indirectly influencing it via job-threats. The distinction is important. The analysis just described is more applicable to the former. This is because in the latter, the shadow prices will <u>automatically change</u> as a result of a change in the constraint (RE). While the comparative statics of the model are complex and ambiguous, we can appreciate this point by considering the following general maximum problem:

$$\text{Max } F(x) \quad \text{s.t.} \quad g(x) = C$$

where x is a vector, which is analogous to our managerial problem. If now the constraint shifts up by C becoming,

$$g(x) = C + \Delta C$$

the first order conditions for a maximum with this new constraint must simultaneously solve the set of equations,

$$F_x + \lambda g_x = 0$$
$$g(x) - (C + \Delta C) = 0$$

rather than the first order conditions for the original constrained maximum:

$$F_x + \lambda g_x = 0$$
$$g(x) - C = 0$$

This will yield a new value on the shadow price of x which may be viewed in utility terms to be λg_x (at X* and λ*) or in resource terms as g_x (at x*).

Considering the costs of enforcement, the indirect approach probably is cheaper for owners since they do not have to incur information costs in determining which factors are non-optimally employed. Since owners are, as previously mentioned, only interested in the returns to them of increased efficiency, an indirect approach through job-threats which increases RE would be preferable. This would allow the managers to adjust in any way they wished so long as RE were covered. Given the possibility that owners could be "wrong", i.e. have changed the price of some Z_i in the wrong direction, or have induced a change in Z_i in the wrong direction, the indirect approach also seems the more preferable. Such an approach would also mean that owners become less involved in the "managing" activity of the firm. If managers and owners were originally different parties because each had a comparative advantage in their respective activies, this strategy would not lead to any underspecialization costs.

2. "Ownership" Strategies in The Firm

We mentioned at the beginning of this section that there are two basic strategies available to owners whose property rights have been violated, surveillance and ownership. We have considered tactics of surveillance and we turn now briefly to ownership tactics, where one party involved in the externality dispute buys out the other. In the case of owner-manager disputes this tactic could be employed by either owners or managers.

If employed by owners, it could involve changes in the managerial contract designed to induce higher efficiency and more returns to owners. This could involve, for example, profit sharing schemes where increases in profits could be legally shared by the managers. There is no guarantee of

course, that management would report any increase in profits, because it could still take the whole of the increase in increased Y. However, such an increased Y may, we have argued, have an effective price different from unity, because of the risk attached to it so that even with no profits sharing some of additional profits will filter down to shareholders. With profits sharing, management could safely increase Y by the contractually agreed n% of RE, owner's returns. Whether they actually chose to reveal increases in earned profits will depend on whether a given increase in profits could more optimally be"taken home" in the form of clandestine increases in Y, or in legal increases in Y. If the optimal amount of a clandestine increase in income, having discounted for risk, is greater than the "legal" change in income the manager may continue to cheat. However, to the extent that he must incur costs in "covering up" for any clandestine activities, the option of cooperating with a profits sharing system would free additional resources for the manager to employ in pursuing other goals. Also, the contracted arrangement regarding profit shares would lower the costs of enforcement by owners since any violation of the contract would be clear, increasing the probability of obtaining an injunction against the managers for the owners.

Casual observation might suggest that the most obvious strategy for any one individual owner would be to increase his share of the ownership by trying to gain a majority of the voting shares. While this would obviously increase the possibility of affecting managerial decisions, we have argued earlier that the costs of enforcement will prevent an owner from gaining all of the potential income of a firm. However, a decrease in the number of owners would firstly lower the costs of enforcement for all owners and hence increase enforcement (since there would be fewer owners). Secondly, a controlling majority of the

voting stock in the hands of one person would lower the costs of coming to a decision among owners.

The possibility also exists for the managers to buy out the owners or to at least gain a majority of the voting stock. Management is in a particularly good position to do this. They have potentially more knowledge of the firm's potential profitability and could therefore offer to buy from existing owners at a higher than current price. By not paying dividends and pursuing other short-term sub-optimal policies they could drive the price of the stock down and then offer to buy it at a higher than market price. This is essentially the strategy discussed by Coase(*). In his example, a sparking railroad which damages the crops of farm land through which it passes buys up the affected land at a depressed price and then "internalizes" the externality by adjusting the spark-farm output. It subsequently resells or rents the farm land at a higher price reaping the gains from adjustment. This is a variant on the merger solution to externalities. This managerial strategy may lead to the formation of holding companies owned by managers; although there may be legal constraints in this regard. In the U.S., the law of corporations varies from state to state, but in most states, a director who purchases stock from a stockholder is not required to tell the stockholder everything he knows about the stock's (potential) value(**). There seems to be no legal constraint on this strategy, and, indeed, the law seems to be ironically written to provide for it.

(*) C.f. Coase, [1960], also Demsetz, [1964].

(**) Houghteling and Pierce, p. 787.

An alternative strategy open to managers to increase their de facto (as opposed to de jure) rights would be to try and increase the costs of enforcement in the hope that it would lower enforcement. An increase in the number of shares of stock might increase CE(e) if this brought about an increase in the number of owners. However, under U.S. corporate law new issues must be approved by the stockholders, and existing stockholders have a pre-emptive right to subscribe to the same percentage of the new stock as is held of the old.(*) Other strategies in this regard would involve forms of devious behaviour designed to "cover up", non-profit maximising behaviour. Thus, glowing reports about the company's performance and changes in book keeping arrangements may make it more costly for stockholders to gather information. Outright non-cooperation such as not providing information about other stockholders would also be rational,(**) as well as "buying" votes(***) directly or indirectly.

(*) Houghteling and Pierce, p. 749-50

(**) Nicols [1967] cites a West Virginia case where the court held that it was permissible to pay off a dissenting shareholder who had wanted a list of other shareholders in order to conduct a proxy fight.

D. Predictions of the Model

1. Factor Price changes, changes in the costs of Enforcement

With respect to making unambiguous comparative static predictions, the model in this general form is not very encouraging for empirical testing. The analysis carried on of increases in the perceived price of a factor, $\hat{P}_i$, showed that the result was generally ambiguous, whether the increase in $\hat{P}_i$ was due to increased e or some exogenous change in the factor market. Similarly, while it is obvious that a decrease in RE will shift the managerial opportunity set up, unless we know a priori the utility function of the manager we can not say unambiguously how that increase will affect the levels of Z_1, Z_2, L, or Y, although we know that at least one of these will increase. Thus while we cannot explicitly identify how an increase in discretion (expansion of the managerial opportunity set) will be "spent", we know that total costs (in the opportunity sense of departures from π^*) will increase. We can also identify when such increases will take place. While the model presented here does not incorporate an explicit theory of the determination of the CE and RE functions, some tentative hypotheses concerning influences on these were explored. These included the number of stockholders and their geographical dispersion, the legal arrangements regarding owner's rights within a firm and "technological" developments affecting communication and surveillance techniques. This is an aspect which requires further research.

2. Zero Enforcement Costs

One additional aspect of the model is that if we assume $CE(e) = 0$ for all levels of e we can derive the neo-classical profit maximising solution. Such an assumption, it must be remembered, is stronger than just assuming information costs are zero because we include communication, adjustment and enforcement costs in CE also. If enforcement (e) is free to owners then they can

effectively employ any level of e in order to enforce their property rights. They will thus increase e until all the possible monopoly profits are distributed to them. To see this recall that,

$$\pi_0 = RE - CE$$

since $CE(e) = 0$ for all e,

$$\pi_0 = RE(e)$$

also $\pi_0 = RE = X(Z_1, Z_2, L_1)P(X) - P_1 Z_1 - P_2 Z_2 - Y$

But the right hand side of the last equation is earned profits, so maximising π_0 is the same as maximising earned profits. Profit maximisation is therefore a special case of this model when the costs of enforcement are non-existent.

3. Demand Shift.

Suppose the firm experiences a shift in its demand curve. For simplicity assume the demand curve shifts down parallel to the original curve; each quantity on the demand schedule is associated with a price that is n% ($n < 100$) of the original price. Assuming the marginal cost curve (of the neoclassical) firm is the same, the monopoly profits decrease from area ABC to area AEF in Figure 10. The shift decreases the total possible earned profits for owners and managers. If enforcement stays at the same level and RE stays the same, managements' opportunity set, $A = \pi^* - RE$, will have decreased because π^* will be lower. If the slope of the marginal revenue from enforcement function is unaffected by this shift then the predictions of the model are straight forward, but depend on the position of the curves. Changing π^* merely changes the upper bound on RE which is stated in condition (4b) of the model:

$$\pi^* < RE \qquad (4b)$$

Diagramatically, Figure 11 shows the effects of a possible shift in this limit. In Figure 11(a), neoclassical profits decrease from π_1^* to π_2^*. This means that

the MR of enforcement curve is truncated at a lower level of e and changes from curve BK_1A_1 to curve BK_2A_2. Now if the MC of enforcement curve cuts the MR of enforcement curve to the left of K_2 then the change in demand will not affect the net rewards of owners, or the optimal level of e, but will reduce the managerial opportunity set from $A_1K_1Ge^*$ to $A_2K_2Ge^*$. (See Figure 11(b).

If the MC of enforcement function intersects the MR of enforcement function to the right of K_2 but to the left of K_1, owners will clearly lose by the amount of triangle G^1K_2E in Figure 11(c). Manager's opportunity set will go from $A_1K_1G^1e^*$ to zero since optimal e* also equals maximal e, at A_2.

The case depicted in Figure 11(d) is similar in that managers opportunity set is zero except this time it is zero in the pre-shift situation. Incidentally the situation depeicted in Figure 11(d) shows that positive enforcement costs are compatible with profit maximising behaviour under some conditions. In the figure, the case is drawn where the optimal level of e is also the one which brings in all the monopoly rents. The discussion earlier, in which it was shown that a profit maximising solution is generated when CE = 0 for all e, must be qualified. No enforcement costs are a sufficient, but not a necessary condition for a profit maximising solution.

The comparative statics in terms of earned profits will be the same for this model as for the neoclassical model, except that in the case drawn in Figure 11(b) when the optimal level of enforcement is unaffected, the net returns of the owners is unaffected. For the other cases depicted, the predictions follow the traditional analysis.

Figure 10

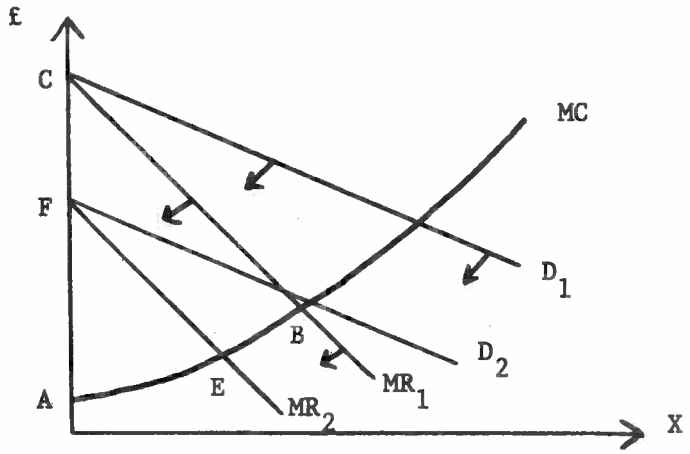
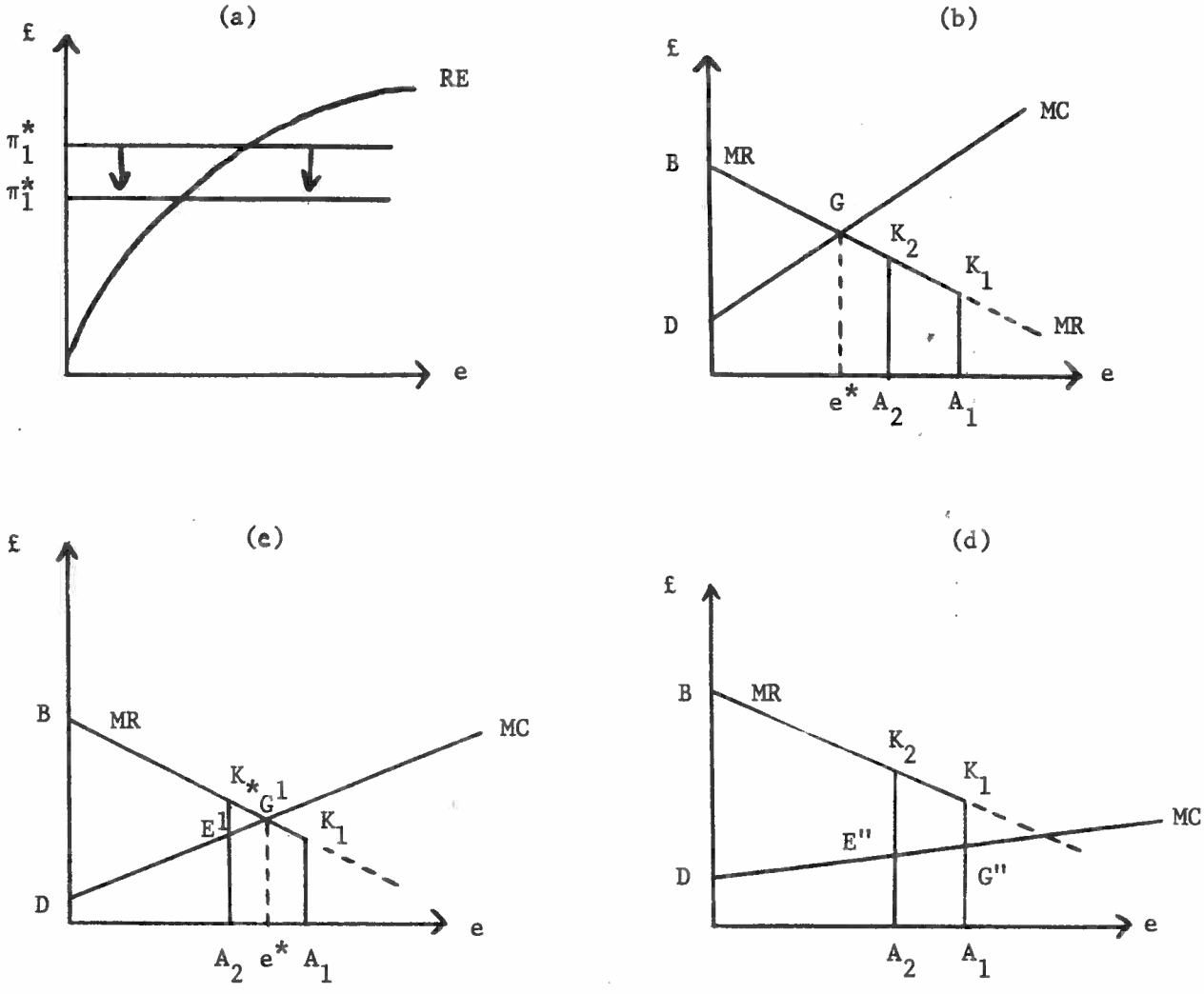


Figure 11



E. Concluding Remarks

In the introduction we referred to two aspects of the theory of firms which may have changed or may be different from the neo-classical theory. Firstly the objective function of the firm's decision makers may have been wrongly specified and secondly the constraints on the decision makers may be different. Under some extreme conditions, the constraints may be such that the only observed behaviour is profit maximising so that such an objective function is sufficient to explain the behaviour of most observed firms. However, we have argued that institutional developments with respect to the owner-manager arrangements in the firm may have shifted the constraint in such a way as to allow for an objective other than the profit maximising one. If this is the case, our models should at least take notice of this possibility since a prior there is little to suggest that managers objectives are always profit maximising. We examined and incorporated two techniques which appear to be well suited for augmenting the neo-classical framework. The utility maximising approach of managers was used and the arguments of the utility function were made as general as seems possible. While our model included only two factors of production, there is no reason why this could not be extended. Also, expenses in the firm which do not contribute to output could easily be incorporated in the analysis, but their inclusion at this stage would seem to add little. The theory of property rights and external behaviour has been incorporated in treating the simultaneous maximum problem of owners. The costs and rewards of enforcement were examined and related to the institutional and legal framework of two particular situations. The analysis could easily be applied to publicly owned firms and government operated firms producing marketable outputs. A model similar to the verbal model implied in the Alchian and Kessel [1962] has been formally specified

in the paper.

In its predictive powers the model is not very encouraging. This is because without knowing the shape of the utility function we cannot say whether an increase in the manager's discretionary budget will be taken out in more cash (Y), which would lead to an increase in earned profits, net of Y, or an increase in inefficiency of the factors due to management's shirking, or an increase in certain factor employments, or some combination of them all. If anything, the model can be used to formally show that in general predictions about managerial behaviour are very difficult to make. However, the model does provide a framework within which one can analyse the owner-manager conflict and understand better the interactions that are involved.

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